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Feasibility and impact of Muara Bulian Bridge construction on the economy of Batang Hari Regency

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Abstract

This study aims to determine the impact of Muara Bulian bridge construction on the economy of Batang Hari Regency. The number of vehicles transporting goods (transport coal and CPO) through the City of Muara Bulian has made congestion in the City of Muara Bulian. Therefore, it takes a diversion of currents for freight vehicles sothey will not cross the city of Muara Bulian. The scope of the research focused on the social and economic impacts of the bridge construction and the feasibility study of the bridge financially. The type of data used is the type of secondary data obtained from interviews and data from related agencies in Jambi Province and Batang Hari Regency in 2016. Based on the results of the research, it is found that: (1) Construction of Muara Bulian Bridge is intended to build isolated areas in the Maro Sebo Ilir Sub district. Maro Sebo Ilir Sub district has enormous potential in terms of both plantations and mining. Potential plantations in Maro Sebo Ilir Sub district are oil palm and rubber while for mining there is coal and oil. The construction of the Muara Bulian bridge is expected to create new economic growth centers in Batang Hari Regency and can increase the strength and opportunities of new business potentials that have not existed in Batang Hari Regency, and (2) road connectivity on the north of the Muara Bulian bridge will be connected to an existing provincial road. To facilitate the flow of transportation to the provincial road, it is necessary to create a new road along ± 3 km with an estimated cost of ± Rp. 8,400,000,000 with standard cost 2,800,000,000 /km.

Keywords: *Financial feasibility, regional economy, socio-economic impact*

INTRODUCTION

Transportation serves as a promoting facility, namely that the procurement/ construction of facilities (infrastructure and facilities) of transportation is expected to help open the isolation of border areas, so it is expected to open accessibility, expand the distribution relationship (trade services and transportation services) outside areas, improving population mobility, and encouraging increased production and productivity, enhancing local capabilities, enhancing local product marketing, which will ultimately improve the welfare of communities and reduce the level of regional disparities.

Bridge as a means of transportation has a very important role for the smooth movement of traffic. The function of the bridge is to connect separate transport routes/ routes by rivers, swamps, lakes, straits, canals, highways, railways and other crossings. In terms of economy, bridges can reduce transportation costs. And in terms of time efficiency, in the presence of bridges can shorten travel time on a separate land trip. The bridge can also increase the lagging area to be able to connect more easily with other

areas. The bridge that is part of the land transportation network system has a role that will encourage economic growth and support the national development in the future.

The development of economic growth in Batang Hari Regency which has increased compared to the previous year, shows a positive thing so that with the development of transportation infrastructure in the form of a bridge in Batang Hari Regency will surely boost economic growth in the district. Muara Bulian sub-district is capitalized in Muara Bulian, consisting of 15 villages and 5 villages with a total area of only 7.2 percent, inhabited as much as 22.99 percent of the entire population of Batang Hari Regency.

Maro Sebo Ilir Sub-district is one of the sub-districts closer to the capital of Batang Hari Regency, but some areas are difficult to reach due to minimal transportation infrastructure. Some areas are still isolated so that the people in Maro Sebo Ilir Sub district still go far enough to transport their commodities. To support the economic rate, the government will continue to support, one of them is through transportation infrastructure development sector. The official government of Batang Hari regency in the year 2016 will plan the construction of the bridge in Muara Bulian Sub district to the District Maro Sebo Ilir. The construction of the bridge is expected to boost economic growth in the District of Maro Sebo Ilir in particular and Batang Hari Regency in general.

Given the importance of the role of the bridge to human life, it must be reviewed the feasibility of the construction of the bridge, in relation to the classification of bridges in accordance with the level of service and ability to accept the burden. In order for the bridge construction to achieve the objectives of quality, cost, volume and time set, it needs a feasibility study on the construction of the bridge. So the construction of this bridge can provide many benefits such as for the wider community that can be tangible labor absorption, utilization of abundant resources in the place, and other benefits of the bridge that has been described previously.

The purpose of this study is to know the feasibility of bridge construction in Bulian Sub-district of Batang Hari Regency from various aspects, economically, law, social, technical, management, finance, and of course environmental aspect.

The benefit of this research is to find out whether bridge development has an effect on the environment in terms of social economy and environment. In addition, the purpose of this research is to know whether the bridge construction project is economically viable to be built.

METHODS

Scope

The scope of this feasibility study involves discussion of environmental aspects, social, economic and cultural aspects that affect bridge development in Muara Bulian Sub-district, position analysis or location of bridge development feasibility, demand analysis and financial analysis by using external data and internal data.

Method of collecting data

Secondary data collection

Secondary data will be collected through related institutions related to the work of the existing data in BAPPEDA Batang Hari District, village, sub-district, district and provincial governments, and related agencies, universities and research institutions. Secondary data then processed as needed.

Primary data collection

Primary data collection is done through field observation, observation, and interviews with residents to explore data and information as complete as possible, so that the program to be prepared can solve the problems encountered. The data were collected through techniques: interview, observation, documentation study and Participatory Rural Apraisal (PRA).

Data analysis

Technical feasibility

Technically it is necessary to study the appropriate investment location and technical solution in the implementation. Search for the best location followed by an analysis of the existing road network linkage, the type of structure that may be used, the cost required, and the ability to carry out the work.

Financial feasibility analysis

Feasibility study of Muara Bulian bridge construction in Batang Hari Regency can utilize financial analysis tools such as Net Present Value (NPV) and Net Benefit Cost Ratio (Net B/C R). From the analysis can be determined whether the bridge making is acceptable/financially feasible or not.

Technical analysis of Net Present Value (NPV)

NPV analysis techniques are very useful to assess the feasibility of a project by calculating the value of current and future acceptance. Project appraisal is done by measuring the prospect of the current receipt of the amount of funds by considering future receipts. If the results of the calculation, NPV is positive then the project plan is feasible to proceed, and vice versa. The formula used for the assessment of NPV (Fahmi, 2016):

$$NPV = \sum_{i=1}^{n} \left(\frac{Bt - Ct}{(1+I)^1} \right)$$

Where :

NPV : Net Present Value
Bt : The gross benefits in year t
Ct : Gross cost in year t
N : Expected project life
I : Interest rate

If NPV> 0, Muara Bulian Bridge Construction is feasible, if NPV <0, it is not feasible.

Analysis of Internal Rate of Returns (IRR)

Internal Rate of Returns can be searched by trial and error method, ie by looking for NPV at the discount rate that we like. If the discount rate we select is NPV positive, then the IRR sought should be above the discount rate, resulting in a larger discount rate.

Conversely, if the discount rate that we take yields negative NPV, then IRR is below the discount rate, so we look for trial and error until we find the discount rate that yields NPV: 0. The formula of the equation to calculate the IRR value is:

$$IRR = i_1 + \frac{NPV_1}{NPV_1 - NPV_2}(i_2 - i_1)$$

Where:

IRR : Internal Rate if Returns
I_1 : The first interest rate at the time of NPVPositive
I_2 : The second interest rate at the time of NPVnegative
NPV_1 : The first NPV1 value at the levelfirst interest
NPV_2 : The second NPV1 value at the moment of levelsecond flower

If IRR > Social Discount Rate of Bridge Construction, then it is feasible. If IRR < Social Discount Rate, then not feasible

Net Benefit Cost Ratio Analysis (Net B/C R)

Actually net benefit cost is a modification of net present value method. If the net present value method finds the difference between the present value of net cash flow and the present value of investment, then the net benefit cost ratio is the division or ratio between the present value of net cash flow and the present value of investment (Siswanto, 2012). The formula for calculating Net BCR is:

$$NetB \quad / CRatio \quad = \frac{\sum_{t=1}^{n} \frac{Bt - Ct}{(1+I)^t}}{\sum_{t=1}^{n} \frac{Ct - Bt}{(1+I)^t}}$$

Net B / C Ratio: Net Benefit Cost Ratio
Bt : The gross benefits in year t
Ct : The gross cost in year t
N : Age is economical
I : Interest rate

RESULTS AND DISCUSSION

Physical area analysis

Watershed

Batang Hari Regency is passed by three major rivers, namely Batang Tembesi, Tabir River and Batang Hari River. Some of the other relatively large rivers include the Dangun Bangko River, the Kayu Aro River, the Rengas River, the Lingkar River, the Great Kejasung River, the Jebak River, the Seringan River, the Lemantan River and the Jelutis River. Besides the big river there are also some small rivers which are the rivers that Singoan River, Bernai River, Mersam River, Bulian River, River Kandang, Aur River, Bacang River and others.

Land ability

Geological conditions and soil structure contained in Batang Hari Regency are predominantly dominated by Neogin (283,986 Ha) followed by sediment area of 171,662 Ha and Tufa Vulcan with 84,472 Ha. The condition of existing soil structure in Batang Hari Regency consists of 2 (two) types of soil, that is alluvial soil type and padsolik red yellow. Alluvial soil type is located around the Batang Hari River and Batang Tembesi River

Environmental impact analysis

Development of infrastructure and infrastructure in an area is needed by the community to improve the quality of life. But development often has little impact. Therefore it is necessary to examine the impact that arises, in this case the positive and negative impacts of the construction of Muara Bulian Bridge.

In the Pre Construction phase, the consequences are public unrest, as a result of the construction of the Muara Bulian Bridge and the increase in land prices at the construction site. In Construction stage, the environmental impact is the decreasing air quality caused by material mobilization, noise due to construction work, and the disruption of traffic smoothness and road construction due to material mobilization. In addition, there are disturbances to the flora and fauna found on the edge of the River Batang Hari.

In Post-Construction stage and start to operate, the impact is the increase of traffic volume of people and goods in Muara Bulian Sub district and Maro Sebo Ilir Sub-district, the increase of population economy, the increase of population coming out in Muara Bulian Sub district and Maro Sebo Ilir Sub-District, possible spread of disease from one region to another due to population growth. In addition, the impact resulting from the construction of the Muara Bulian Bridge is the sanitation of the community which is getting worse due to the large number of population along with the increasing of society economy in Muara Bulian Sub district and Maro Sebo Ilir Sub district.

SWOT bridge construction analysis

Based on the analysis of general variables and special variables, SWOT analysis is performed which is one of the analytical methods to identify the factors that become the strengths and weaknesses and opportunities and threats that will systematically be considered for the feasibility of building the Muara Bulian Bridge.

Based on the SWOT matrix (Table 1), the Feasibility Study of Bulian Bridge in Batang Hari Regency is in Future Quadrant position. Future Quadrant is a quadrant has many strength variables in addition to many variables of opportunity that can be utilized properly. With so many variables of opportunity available, the organizational unit is expected to be able to approach the target of perfection in its operations as a very independent organization. The strategy recommendations that necessary include:

1. Retrenchment and enhancement, this point is related to efficiency efforts of cost center units and bridge development optimization. Increased efficiency can be done with accurate unit cost analysis and benchmarks with other equivalent bridges.
2. Market and Product Development, this point relates to the development of bridge type and model. Construction of Bulian Bridge can be done by cooperating with various institutions / institutions.
3. Vertical Integration, this point is related to support from the government, so that the program can run with sustainable. This is carried out continuously aligning programs and activities in accordance with what has been standardized and regulated by the government, both at the central and in the region to create a conducive cross-sector cooperation climate.

Table 1. SWOT matrix construction of Muara Bulian Bridge

INTERNAL FACTORS				**EXTERNAL FACTORS**			
POWER ASSESSMENT	SCORE	VALUE	NT	ASSESSMENT OF OPPORTUNITY	SCORE	VALUE	NT
1. Has the potential to open a new growth center (has added value for the expansion of the city)	35	5	175	1. The average flow of the watershed is physically straight and there are no basins	45	5	225
2.The end of the bridge or the north has direct access to the eastern road of Sumatra with the potential of natural resources in the form of rubber, palm, and coal mining	25	4	100	2. The southern part of the bridge is relatively less densely populated with potential coal mines	25	3	75
3.Sedimentation is relatively lower	20	3	60	3. Have access road to the outer ring of the city, so it can be an alternative for large vehicles not through the city of Muara Bulian.	30	2	60
4.Access closer to Tembesi bridge which is road access goods and services from Tebo and Bungo and West Sumatra	20	4	80				
Total	100		415	Total	100		360
WEAKNESS RATING	SCORE	VALUE	NT	ASSESSMENT OF THREATS	SCORE	VALUE	NT
1.There is no main road access so the mileage from the main road to the river mouth far	35	5	175	1. Increasing the number of traffic accidents in the location due to an increase in traffic flow in the location.	45	4	180
2. Must create a new path for connection to the path	25	3	75	2. The emergence of new slums.	25	3	75
3.Increased existing road segment in the south	25	4	100	3. Can Increase competition between economic actors.	30	3	90
4.Increased costs for new road construction and road expansion.	20	2	40				
Total	100		390	Total	100		345
Difference Strengths and Weaknesses			35	Differences Opportunities and Threats			45

Source: Survey Result

Analysis of socio-economic impacts

Social impacts

Social mobility impacts

Muara Bulian Bridge is a gift because it directly connects between Maro Sebo Ilir Sub district to urban area namely Muara Bulian city. Thus the community can easily supply access to their life needs because of the Muara Bulian bridge. While the negative impact associated with the increasing number of drug distribution, criminality and localization. Looking at the growth model in the concept of development, it can be said that the government intervention in Muara Bulian bridge construction makes the people in Maro Sebo Ilir Sub-district become a society that level up to be a pre-condition society taking off. This is because government intervention in development leads to progress in social mobility.

Impact of education sector

The impact of Muara Bulian bridge construction in terms of education brings a positive affect for the community in the Maro Sebo Ilir Sub district Batang Hari Regency, especially the community on the outskirts of the river Batang Hari. It appears that there is an effort to build qualified human resources so that the community becomes the implementer in development in their own region as preparation when their area is developed better. The number of school children in the north of Kota Muara Bulian has been relying on the transportation of rivers to their schools. It is expected that the bridge of Muara Bulian will be an alternative for school children more smoothly to the school. In addition, if looking at the social impact of infrastructure development directly can also affect social change as disclosed by Soekanto (1987) that advanced education and future-oriented also become a driving factor in social changes that exist in Maro Sebo Ilir Sub district Batang Hari Regency.

Impact of culture field

Positive impact of the bridge Muara Bulian relates to the status change in the District of Maro Sebo Ilir Batang Hari Regency from the remote area becomes a more lively area. Community based on religious values becomes increasingly faded. The direct social impacts of infrastructure development can also affect social change such as) in that it is connected with other cultural contacts, the respect for one's work and the desire to move forward and the open system in the layers is also a driving factor in the existing social change.

Economic impacts

The impact of smooth flow of transportation

The existence of Muara Bulian bridge construction has a positive impact for the people of Maro Sebo Ilir Sub-district, Batang Hari Regency. Flow of transportation more smoothly so that makes it easier for people to cross and distribute goods / services to Muara Bulian City and vice versa. Time and cost in the distribution of goods / services more effective and efficient.

Impact of community economic activity

The existence of Muara Bulian bridge construction not only bring positive impact. However, it also has a negative impact on the economic activities of the people in Maro Sebo Ilir Sub-district, Batang Hari Regency. The Muara Bulian bridge makes

those who are active and creative have a new job. As for those who are less active become victims due to the construction of the bridge Muara Bulian.

Impact of community revenue rate

The existence of Muara Bulian bridge construction not only bring positive impact. However, it also has a negative impact on the income level of the people in Maro Sebo Ilir Sub-district, Batang Hari Regency. The Muara Bulian bridge enables those who are active and creative to have new jobs that also affect income generation. As for those who are less active and creative in getting around the situation leads to a decrease in their income.

Feasibility analysis of Muara Bulian bridge

The design of the bridge is very important in describing the icon of a particular region. The artistic aspect is very influential in the determination of a design of the bridge to be built. In addition, a bridge design must have distinctive features that distinguish bridges built with other existing bridges. In the selection of bridge design, must pay attention to the existing soil structure in the location of the bridge construction plan. The soil structure will affect the type of bridge and the type of foundation to be used in the construction of the bridge. The length of the expanse of the bridge to be built should also be considered before the construction of the bridge, this will be related to the bridge resistance in holding the vehicle load that will pass through the bridge.

There are 3 alternative designs studied for the construction of the bridge Muara Bulian, namely:

1. The design of the bridge Muara Bulian alternative 1 is a bridge with 7 steel frame design. Trapezoidal bridge frame with a length of 60 m per frame. This design has the advantage of good enough resistance because it is supported by many pillars so that the load point on the bridge is not too heavy.
2. The design of the bridge Muara Bulian alternative 2 is a bridge with 2 steel frame design. The framework of the semicircular bridge with a length of 200 m per frame. The curved design will naturally divert the load received to the floor of the bridge vehicle to the abutment and the pillars that keep both sides in order not to move sideways. The main structure of the bridge is constructed and supported so that most of the load is lapped into the foundation by force on the element. This type of curved bridge is more efficiently used for bridges with a stretch of 100-300 m.
3. The design of the bridge Muara Bulian alternative 3 is a bridge with cable stayed design. cable stayed is a bridge that uses high-powered cables as a hanger that connects the rumble with the tower.

Any form of bridge to be created has a cost of investment berberda. For more details can be seen in the following table:

Table 2. Financial analysis bridge of Muara Bulian Bridge

Bridge Design	Financial Analysis				
	Investation	NPV	IRR	PI	BEP
Alternatif 1	Rp. 118.314.042.000	33.140.261.444	16,17	1,28	27 Years
Alternatif 2	Rp. 121.596.167.000	29.687.953.416	16.09	1,24	27 Years
Alternstif 3	Rp. 304.948.798.000	-163.171.782.256	11,27	0,46	46 Years

Source: Technical Team

The table above explains that only alternatives 1 and 2 are financially viable to build. This can be from a PI value > 1 and a positive NPV value. However, alternative bridges 3 have aesthetics and appeal that make alternative bridges 3 can be considered

to increase tourist attraction to come to Batang Hari Regency. With the increase of tourists who come to Batang Hari Regency can improve the economy of Batang Hari and Maro Sebo Ilir District, which has been partly underdeveloped in the economy.

Benefit cost ratio (B / C R) is a common project selection analysis because it is easy, ie the comparison between benefit and cost. If the value is <1 then the project is not economical, and if> 1 means the project is feasible. If B / C ratio = 1 is said the project is marginal (no loss and no gain). The Muara Bulian bridge construction plan has a positive Benefit Cost Ratio on alternatives 1 and alternatives 2 that is equal to 1.28 for alternative 1 and equal to 1.24 for alternative 2 with B / C ratio greater than 1, then the construction plan of Muara Bulian bridge is fisibel or economically justifiable.

Based on the results of NPV calculations, it appears that the results obtained are positive, which means that the investment is feasible to be implemented. By using a good NPV of 15%, and 16% concluded that the investment is worthy of acceptance because this activity can be profitable for investors. From the feasibility analysis of the above projects, it can be concluded that the construction of the Muara Bulian bridge is economically feasible. So that the construction of Muara Bulian bridge can be implemented to facilitate transportation in Batang Hari Regency.

CONCLUSIONS

1. The construction of the Muara Bulian Bridge is intended to build isolated areas in Maro Sebo Ilir Sub-district during this time. Maro Sebo Ilir Sub-district has enormous potential in terms of both plantations and mining. Potential plantations in the District of Maro Sebo Ilir are oil palm and rubber while for mining there is coal and oil. In addition, the construction of the Muara Bulian bridge is expected to create new economic growth centers in Batang Hari Regency.
2. Construction of the bridge is needed to open the isolation of the northern part of the bridge (the northern part of Muara Bulian city). Because it can increase aksebilitas goods and services from the western part of Jambi province. So as to reduce the cost of transportation of goods and services. The current density of vehicles that have caused congestion in several streets such as in Muara Bulian City and in front of Jambi Mendalo University campus can be reduced.
3. The road connectivity on the north of the Muara Bulian bridge will be connected to an existing provincial road. To facilitate the flow of transportation to the provincial road, it is necessary to construct a new road along ± 3 km with an estimated cost of ± Rp. 8,400,000,000 with standard cost 2,800,000,000 / Km.

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